Inequality in Health Outcomes in India: The Role of Caste and Religion

Inequality in Health Outcomes in India: The Role of Caste and Religion

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Abstract

The "social gradient to health" - whereby people belonging to groups higher up the social ladder had better health outcomes than those belonging to groups further down - is essentially a Western construct; there has been very little investigation into whether, in developing countries also, people's state of health is dependent on their social status. The purpose of this paper is to evaluate the relative strengths of economic and social status in determining the health status of persons in India. In other words, even after controlling for non-community factors, did the fact that Indians belonged to different social groups, encapsulating different degrees of social status, exercise a significant influence on the state of their health? The existence of a social group effect would suggest that there was a "social gradient" to health outcomes in India. Furthermore, there was the possibility that the "social gradient" existed with respect to some outcomes but not to others. In investigating this, the paper addresses, in the Indian context, an issue which les at the heart of social epidemiology: estimating the relative strengths of individual and social factors in determining health outcomes.

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1. Introduction

The publication of the Black report (Black *et. al.*, 1980) spawned a number of studies in industrialised countries which examined the social factors underlying health outcomes. The fundamental finding from these studies, particularly with respect to mortality and life expectancy, was the existence of "a social gradient" in mortality: "wherever you stand on the social ladder, your chances of an earlier death are higher than it is for your betters" (Epstein, 1998). The social gradient in mortality was observed for most of the major causes of death: for example, Marmot (2000) showed that, for every one of twelve diseases, the ratio of deaths (from the disease) to numbers in a Civil Service grade rose steadily as one moved down the hierarchy.

Since, in the end, it is the individual who falls ill, it is tempting for epidemiologists to focus on the risks inherent in individual behaviour: for example, smoking, diet, and exercise. However, the most important implication of a social gradient to health outcomes is that people's susceptibility to disease depends on more than just their individual behaviour; crucially, it depends on the social environment within which they lead their life (Marmot, 2000 and 2004). Consequently, the focus on inter-personal differences in risk might be usefully complemented by examining differences in risk between different social environments.

For example, even after controlling for inter-personal differences, mortality risks might differ by occupational class. This might be due to the fact that while low status jobs make fewer mental demands, they cause more psychological distress than high status jobs (Karasek and Marmot, 1996; Griffin *et. al.*, 2002; Marmot, 2004) with the result that people in higher level jobs report significantly less job-related depression than people in lower-level jobs (Birdi *et.al.*, 1995).

In turn, anxiety and stress are related to disease: the stress hormones that anxiety releases affect the cardiovascular and immune systems with the result that prolonged exposure to stress is likely to inflict multiple costs on health in the form of *inter alia* increased susceptibility to diabetes, high blood pressure, heart attack, and stroke (Marmot, 1986; Wilkinson and Marmot, 1998; Brunner and Marmot, 1999). So, the social gradient in mortality may have a psychosocial basis, relating to the degree of control that individuals have over their lives.[1]

The "social gradient to health" is essentially a Western construct and there has been very little investigation into whether, in developing countries as well, people's state of health is dependent on their social status. For example, in India, which is the country studied in this paper, we know from studies of specific geographical areas that health outcomes differ systematically by gender and economic class (Sen, Iyer, and George, 2007). In addition, local government spending on public goods, including health-related goods, is, after controlling for a variety of factors, lower in areas with greater caste fragmentation compared to ethnically more homogenous areas (Sengupta and Sarkar, 2007).

Considering India in its entirety, two of its most socially depressed groups - the *Adivasis*[2] and the *Dalits*[3] - have some of the worst health outcomes: for example, as Guha (2007) observes, 28.9 percent of Adivasis and 15.6 percent of Dalits have no access to doctors or clinics and only 42.2 percent of *Adivasi* children and 57.6 percent

[1] Psychologists distinguish between stress caused by a high demand on one's capacities – for example, tight deadlines – and stress engendered by a low sense of control over one's life.
[2] There are about 85 million Indians classified as belonging to the "Scheduled Tribes"; of these, *Adivasis* (meaning original inhabitants") refer to the 70 million who live in the heart of India, in a relatively contiguous hill and forest belt extending across the states of Gujarat, Rajasthan, Maharashtra, Madhya Pradesh, Chhattisgargh, Jharkhand, Andhra Pradesh, Orissa, Bihar, and West Bengal (Guha, 2007).
[3] Dalits, who number about 18 million, refer to those who belong India's "Scheduled Castes" and may be broadly identified with the "untouchable" castes i.e. those with whom physical contact – most usually taken to be the acceptance of food or water – is regarded by upper-caste Hindus as ritually polluting or unclean

of *Dalit* children have been immunised. Of course, it is possible that the relative poor health outcomes of India's socially backward groups has less to do with their low social status and much more to do with their weak economic position and with their poor living conditions. The purpose of this paper is precisely to evaluate the relative strengths of economic and social status in determining the health status of persons in India. In other words, even after controlling for non-community factors, did the fact that Indians belonged to different social groups, encapsulating different degrees of social status, exercise a significant influence on the state of their health?

We answer this question using data from the *Morbidity and Health Care Survey* (hereafter, referred to as the M&HC Survey), for the period January-June 2004, conducted over all the states and union territories in India, by the Government of India's National Sample Survey Organisation (NSSO).[4] The M&HC Survey covered 73,868 households, encompassing 383,338 individuals. It examined several aspects of morbidity and health care of the respondents but, from this study's perspective, three of these are of note:

(i) Particulars of household members who died with the past 365 days.

(ii) Particulars of economic independence and ailments on the date of survey of persons aged 60 years or more (hereafter, "elderly" persons).

(iii) Particulars of prenatal and postnatal care for ever married women.

These aspects of morbidity and health care could *inter alia* be correlated with the social background of the households to which the respondents belonged. The M&HC Survey offered information about households in terms of the following social groups:

1. *Adivasis* (see note 2)

[4] For background on the NSSO see Tendulkar (2007).

2. Scheduled Tribe (ST) Christians.[5]

3. *Dalits* (see note 3).

4. Non-Muslims from the Other Backward Classes (OBC).[6]

5. Muslims from the OBC.

6. Muslims not from the OBC.

7. Forward Caste Hindus (hereafter, simply "Hindus").[7]

8. Non-ST Christians.

9. Sikhs.

10. Other Religions.

The primary aim of this paper is to examine whether the following health outcomes varied systematically according to the social group to which people belonged:

(i) The age of death

(ii) The self-assessed health status of persons 60 years of age or more

(iii) The likelihood of elderly persons, who were in poor health, taking treatment for their ailments.

(iv) The likelihood of women receiving prenatal and postnatal treatment

The purpose was to investigate whether, *after controlling for several non-group factors that might impinge on health outcomes*, people's health outcomes were significantly affected by their social group. The existence of a social group effect – whereby groups higher up the social ladder had better health outcomes than groups

[5] As Guha (2007) notes, Scheduled Tribe Christians have been exposed to modern education in English and have a much greater chance of being absorbed in the modern economy. They also live mainly in the hills of North-East India which are some of the remotest and less accessible parts of the country.
[6] These are persons who, while not belonging to the Scheduled Tribes or Scheduled Castes, nevertheless belong to economic and socially backward groups.
[7] Forward caste Hindus were Hindus who were not included in the OBC/Dalit/ST categories. However, since the designation of groups in the OBC category is a state responsibility a particular (caste) group may be included in the OBC category in one state (i.e. be excluded from forward caste Hindus) but be excluded from the OBC category in another state (i.e. be included in forward caste Hindus).

further down – would suggest that there was a "social gradient" to health outcomes in India. Furthermore, there was the possibility that the "social gradient" existed with respect to some outcomes but not to others. In so doing, the paper addresses, in the Indian context, an issue which les at the heart of social epidemiology: estimating the relative strengths of individual and social factors in determining health outcomes.

2. Deaths in Households

The M&HC Survey asked households if any of their members had died in the previous year and, if the answer was in the affirmative, collected information about the deceased and some of the circumstances surrounding the deaths. In total, 1,716 deaths were reported: 1,634 of these deaths (95 percent) were from households which had experienced a single death in the past year; 70 deaths (4 percent) occurred in households which had experienced two deaths; and 12 deaths (1 percent) occurred in households which had experienced three deaths.

Of these 1,716 deaths, 9.1 percent were *Adivasis*, 17.6 percent were *Dalits*, and 12 percent were Muslim, and 21.3 were Hindus (Table 1). By contrast, *Adivasis*, *Dalits*, and Hindus comprised 7.9, 16.9, and 23.6 percent, respectively, of the total of the 383,288, persons in the M&HC-NSS sample. Thus, in respect of *Adivasis* and *Dalits*, there was a difference between their proportionate presence in the number of deaths and their proportionate presence in the sample.[8]

A more marked difference between the groups was in terms of the mean and median ages at death: as Table 1 shows, the mean age of death was 43.3 years for *Adivasis*, 41.6 years for *Dalits*, 43.4 years for OBC Muslims, and 43.8 years for non-OBC Muslims; by contrast, the mean age at death was 57.5 for Sikhs and non-ST

[8] Of the 1,716 deceased, 58 percent were men. For all the groups the majority of deaths were male except for ST Christians where 55 percent of the 65 deaths in this group were female.

Christians, 54.2 years for Hindus, 49.4 years for ST Christians, and 48.4 years for the non-Muslim OBC.

Table 2 shows whether the deceased received medical attention before death. The group least likely to receive medical attention before death were Adivasis and ST Christians: only 59 percent of *Adivasi* deaths and 53 percent of ST Christian deaths received medical attention in contrast to 76 percent of *Dalit* deaths and 73 percent of Muslim deaths. Although, in terms of the overall sample, there was little difference between the proportions of men and women receiving medical attention before death (69 percent men, 71 percent women) there were marked gender differences between some of the social groups: Muslim deaths were more likely to receive medical attention if they were women (80 percent against 70 percent for on-OBC Muslims) while *Dalit* deaths were more likely to receive medical attention if they were men (80 percent against 71 percent).

Table 3 presents the estimates from regressing the "age at death" on a number of explanatory variables.[9] The first column shows the regression estimates obtained from all deaths in the sample; the second and third columns show the regression estimates obtained from all deaths in, respectively, the "forward" and "backward" states (and union territories) of India.[10] The mean ages at death in the forward and backward states were, respectively, 52.4 and 43.7 years – a difference of 8.7 years. After imposing all the controls shown in Table 3, the difference between forward and backward states in their averages at death was reduced to 7.4 years (Table 3, column 1)

[9] Excluding the 27 deaths which occurred during pregnancy.
[10] "Forward states": Andhra Pradesh, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Pondicherry, Punjab, Tamil Nadu, West Bengal. The remaining states and union territories were classed as "backward" states.

The second variable in the regression was gender: Table 3 shows that, after controlling for other variables, there was no significant difference between the average ages of the male and female deceased.[11] The next variable was whether the household type in which the deceased lived was a "labourer" household[12]: Table 3 shows that, after imposing all controls, the average age at death was 4.3 years lower for labourer, compared to non-labourer, households. Since the sample differences between non-labourer and labourer households in the ages of their deceased was 6.9 years, imposing the controls, reduced this difference but without eliminating it. Table 3 also shows that the average age at death was significantly different between labourer and non-labourer households in the forward states but *not* in the backward states. The average age of the deceased was significantly higher, by 4.9 years, in rural, compared to urban, areas and, in the backward states, the rural-urban difference average age at death was 7.8 years; however, in the forward states, there was no significant difference between rural and urban areas in the average age at death.

After these four controls – state type, gender, household type, and rural-urban sectors – the next set of controls related to the conditions in which the deceased lived.

1. The first component of this was the *type of housing structure* in which the deceased lived: this variable ("structure") was assigned the value 1 if the type was *pucca*, or semi-*pucca*, or "serviceable" *kutcha* (i.e. good); and 0 otherwise.
2. The second component of living conditions related to the *quality of the latrines* used by the deceased: the variable "latrine" was assigned the value 1 if the latrines were flushing toilets or emptied into a sceptic tank; and 0 otherwise.

[11] The sample averages for age at death were 48.4 and 46.2 years for male and female deaths, respectively.
[12] Agricultural or other labour for rural households and casual labour for urban households.

3. The third component of living conditions related to the *quality of the drains*: the variable "drain" was assigned the value 1 if the drains associated with the deceased's home were underground or were covered *pucca*; and 0 otherwise.

4. The fourth component of living conditions related to the *quality of the source of drinking water* used by the deceased: the variable "water source" was assigned the value 1 if the source of drinking water was from a tap; and 0 otherwise.

5. The fifth component of living conditions related to whether the drinking water used by the deceased was *treated*: the variable "water treated" was assigned the value 1 if the drinking water was treated; and 0 otherwise.

6. If the drinking water in the deceased's household was treated, the sixth component of living conditions related to the *nature of the treatment* of the drinking water: the variable "water treatment" was assigned the value 1 if the nature of treatment was boiling, filtering, or ultra-violet/resin/reverse osmosis; and 0 otherwise.

7. The seventh, and last, component of living conditions related to the *nature of the cooking fuel* used by the deceased's household: the variable "cooking fuel" was assigned the value 1 if the cooking fuel was gas, *gobar* gas, kerosene, or electricity; and 0 otherwise.

Table 3 shows that, of these seven living conditions controls, it was only the nature of treatment of drinking water and of the type of cooking fuel used that had a significant effect on the age of the deceased. The average age of deceased persons whose drinking water was boiled or treated through chemical means was, over India

in its entirety, 11.8 years higher than that of those whose drinking water was either not treated or treated through "other means"; for "forward" and "backward" states, this difference was, respectively, 10.9 and 12.6 years. Similarly, the average age of deceased persons whose households used gas (including *gobar* gas), kerosene, or electricity as their cooking fuel was 5 years higher than that of those whose households used "other" fuels.[13]

After controlling for the living conditions of the deceased, the next set of controls related to the economic position of the deceased's households. This was measured by a household's consumer expenditure in the past 30 days. Table 3 shows that an increase of Rs.1,000 in monthly household expenditure would raise the average age of death by approximately 0.4 years though, it must be added that, after the other controls had been imposed, the significance of the relation between monthly expenditure and the mean age of death was very weak.

Table 3 shows that, *even after imposing all the above controls*, the average age of the deceased was significantly affected by the social group to which they belonged. Compared to the average age at death of Hindus (the control group), the average age at death of: *Adivasis* was 4.9 years lower for India in its entirety and 6.7 years lower for the backward states; *Dalits* was 7.1 years lower for India in its entirety and 11.5 years lower for the backward states; OBC Muslims was 8.6 years lower for India in its entirety and 11.9 years lower for the backward states; non-OBC Muslims was 6.1 years lower for India in its entirety and 6.8 years lower for the forward states. By contrast, there was no significant difference in the ages of deceased persons between Hindus and the (non-Muslim) OBCs.

[13] For backward states, this difference was significant only at 10% and for forward states it was not even significant at this level.

3. The Health of Elderly Persons

Table 4 shows the perceptions of persons, aged 60 years or more ("elderly persons"), about their state of health: excellent/very good; good/fair; poor. While 25 percent of the entire sample of 33,155 elderly persons described themselves as being in poor health, this description was offered by 28 percent of *Dalits* and 31 percent of Muslims (OBC and non-OBC). By contrast, only 16 percent of ST Christians and 20 percent of *Adivasis* regarded themselves as being in poor health.

Table 5 shows the *marginal probabilities* obtained from estimating an ordered logit model in which the dependent variable took the value 1, 2, or 3 depending on whether a person described his/her state of health as excellent/very good; good/fair; poor. The *marginal probability* associated with a variable is the change in the probability of an outcome, following a change in the value of a variable. For each variable, these probabilities sum to zero across the three outcomes (i.e. the three states of health) and for discrete variables – as are all the explanatory variables used, except *age* - the marginal probabilities refer to changes in the probability of the outcomes, consequent on a move from the default category for that variable to the category in question.[14] For ease of exposition, the subsequent discussion focuses, in the main, on the marginal probability of *regarding oneself* to be in poor health (hereafter, simply, "the probability of poor health").

According to Table 5: (i) moving from a backward state to a forward state would *reduce* the probability of poor health by 1.1 points; (ii) being female would *increase* the probability of poor health by 4.3 points. The effect of age on the probability of poor health depends not only upon the increase in age but, because of

[14] In an ordered logit model, the signs of the coefficient estimates associated with a variable do not predict the directions of change in the probabilities of the outcomes and these probabilities have to be separately calculated.

the presence of the non-linear term age^2, also upon the age itself. So, for an additional year in age from *N* years, age^2 would increase by $(N+1)^2 - N^2 = 2N+1$. Therefore, if *N=60*, the probability of poor health would increase by 5.2 - 121×0.03 = 1.57 points for an additional year; if *N=75*, the probability of poor health would increase by 5.2 - 151×0.03 = 0.67 points for an additional year. In other words, the probability of poor health would increase with age, *but at a diminishing rate*, and, after a certain age *(N=87)*, would not change with increasing years.

Table 5 suggests that people's perception of the state of their health was significantly affected by their level of education. Compared to an illiterate person (the default level), the probability of poor health was: 1.6 points lower for a person educated up to primary schooling ("low education"); 4.2 points lower for a person educated above primary and up to secondary level; and 7.4 points lower for a person educated up to higher secondary or more.

Living conditions exerted a significant effect on the probability of poor health: good housing conditions ("structure") reduced this probability by 3.2 points; a good source of drinking water ("water source") reduced it by 3.1 points while treating drinking water and, furthermore, treating it "properly" reduced it by, respectively, 4.3 and 5.4 points; lastly, using a "clean" fuel for cooking lowered the probability of poor health by 3.4 points. In total, therefore, good living conditions were capable of reducing the probability of poor health by nearly 20 points.

Over and above, these factors, the economic position of a household also had a significant effect on the probability of poor health: compared to elderly persons from households whose monthly expenditure was in the top quartile (the control group), elderly persons from households whose monthly expenditure was in the lowest,

second, and third quartile were more likely to be in poor health by, respectively, 4.4, 3.7, and 2.2 points.

Lastly, even after controlling for all the above factors, Table 5 shows that the social groups to which people belonged had a significant effect on their probabilities of poor health: compared to Hindus (the control group), *Adivasis* and ST Christians were *less* likely to be in poor health by, respectively, 5.0 and 8.3 points; on the other hand, Dalits, OBC Muslims, and non-OBC Muslims were *more* likely to be in poor health by, respectively, 2.6, 5.5, and 8.1 points.

Table 6 records the primary ailments of elderly persons who regarded their state of health as "poor". For example, of the 258 such persons who happened to be *Adivasis*, 5 percent primarily suffered from gastro-intestinal problems (GASTR), 9 percent from cardiovascular disease (CARD), 11 percent from respiratory problems (RESP); 12 percent from disorders of the joints (JOINT); 2 percent from diseases of the kidney or urinary system (KIDNY); 4 percent from neurological disorders (NEURO); 10 percent from eye disorders (EYES); 2 percent from diabetes (DIABT); 4 percent from fever-related illness (FEVER); 24 percent from disabilities (DISAB); 2 percent from accidents/injuries/burns (ACC); 1 percent from cancer (CANC); and 14 percent from other ailments (OTHER).

The distribution of the incidence of cardiovascular disease (including hypertension) between the social groups is interesting: 33 percent of non-ST Christians and 19 percent of Hindus, Sikhs, and persons from other religions – aged 60 or more and in poor health – suffered from cardiovascular diseases; by contrast, this ailment affected only 4 percent of ST Christians, 9 percent of *Adivasis* and *Dalits*, 12 percent of non-Muslim OBCs, and 16 percent of Muslims. Similarly, compared to the 6 percent of Hindus who were diabetic, only 2 percent of *Adivasis* and 1 percent

of *Dalits* had diabetes. On the other hand, 33 percent of ST Christians, 24 percent of *Adivasis*, 16 percent of *Dalits* , and 18 percent of OBC Muslims – compared to only 12 percent of Hindus – suffered from disabilities.[15]

Table 7 shows the proportion of elderly persons, who were in poor health, from the different social groups who were not taking any treatment for their ailments: 38 percent of *Adivasis*, 44 percent of ST Christians, and 33 percent of *Dalits*, were not taking any treatment for their ailments in contrast to 15 percent of Hindus, 11 percent of non-ST Christians, and 18 percent of Sikhs. In order to determine the probabilities of the different persons taking/not taking treatment for their ailments, we estimated a logit model over the sample of 5,484 elderly persons, who were in poor health, in which the dependent variable took the value 1 if the person was taking treatment and 0 if he/she was not.

The marginal probabilities from this model are shown in Table 8. Compared to living in a "backward" state, living in a "forward" state significantly increased the probability of taking treatment by 11.0 points. However, there was no significant difference between women and men, or between persons in the rural and urban sectors, in their probabilities of taking treatment. Having a living daughter had no significant effect on the probability of taking treatment though having a living son raised it by 8.3 points!

The level of education of a person, and the economic position of his/her household, had a significant effect on the probability of taking treatment. Compared to an illiterate person (the default level), the probability of taking treatment was: 6.6 points higher for a person educated up to primary schooling ("low education"); 10.8 points higher for a person educated above primary and up to secondary level; and 9.4

[15] Locomotor; visual (including blindness, excluding cataract); speech; hearing.

points higher for a person educated up to higher secondary or more. Compared to persons from households whose monthly expenditure was in the top quartile (the control group), persons from households whose monthly expenditure was in the lowest, second, and third quartile were less likely to take treatment by, respectively, 16.1, 11.5, and 4.6 points.

Another set of factors affecting the probability of people taking treatment comprised their: degree of economic independence, living arrangements, and degree of mobility. Compared to a person who was totally dependent (the default case), the probability of taking treatment was 4.9 points higher for someone who was completely independent and 3.5 points higher someone who was only partially dependent. Compared to living with a spouse, people living without a spouse – whether living alone or with others – were less likely, by 5.1 points, to take treatment. Compared to persons who were totally mobile or else with mobility restricted to the home, people who were confined to bed were more likely, by 5.5 points, to take treatment.

However, even after controlling for all the above factors, Table 8 shows that the social groups to which people belonged had a significant effect on their probabilities of taking treatment: compared to Hindus (the control group), *Adivasis*, ST Christians, and *Dalits* were *less* likely to take treatment by, respectively, 10.6, 22.5, and 9.0 points; non-OBC Muslims and the non-Muslim OBCs were less likely to take treatment by, respectively, 7.7 and 5.7 points.

Table 9 assesses the predictive performance of the logit model of taking treatment. A person was predicted as taking (not taking) treatment if the predicted probability from the logit model, of his taking treatment, was greater (less) than half. Table 9 shows that of the 5,238 persons predicted to be taking treatment, 4,027 were

actually taking treatment – a predictive accuracy of 77 percent; however, only 131 of the 246 predicted to be not taking treatment, were actually not taking treatment – a predictive accuracy of 53 percent. Overall, therefore, 4158 persons out of 5,484 were correctly classified – a predictive accuracy of 76 percent.

4. Prenatal and Postnatal Care

The M&HC-NSS provided information, by social group, on the prenatal and postnatal care received by ever married women below 50 years of age. Table 10 shows that, compared to 15 percent of Hindu women who did not receive prenatal care, such care was not received by: 31 percent of *Adivasis*, 38 percent of ST Christians, 26 percent of *Dalits*, 33 percent of OBC Muslims, and 26 percent of non-OBC Muslims. Similarly, compared to 27 percent of Hindu women who did not receive postnatal care, such care was not received by: 44 percent of *Adivasis* and ST Christians, 37 percent of *Dalits*, 36 percent of OBC Muslims, and 34 percent of non-OBC Muslims. In order to determine the probabilities of women receiving prenatal and postnatal care, we estimated, a logit model in which the dependent variable took the value 1 if the woman received the relevant care and 0 if she did not. The marginal probabilities from this model are shown in Table 11.

Compared to living in a "backward" state, living in a "forward" state significantly increased the probability of prenatal care by 15.3 points but it did not have a significant effect on the probability of postnatal care. However, compared to urban women, the probability of rural women receiving prenatal and postnatal care was significantly lower by, respectively, 2.8 and 4.7 points.

The level of education of women had a significant effect on the probability of their receiving both prenatal and postnatal care. Compared to an illiterate person (the default level), the probabilities of receiving prenatal and postnatal care were,

respectively: 9.0 and 4.0 points higher for a person educated up to primary schooling ("low education"); 14.0 and 11.0 points higher for a person educated above primary and up to secondary level; and 15.7 and 14.0 points higher for a person educated up to higher secondary or more. The economic position of the women's households exercised a significant positive influence on their probability of receiving prenatal care but *not* on their probability of receiving postnatal care: compared to women from households whose monthly expenditure was in the top quartile (the control group), women from households whose monthly expenditure was in the lowest, second, and third quartile were less likely to take treatment by, respectively, 3.3, 4.5, and 2.0 points.

However, even after controlling for all the above factors, Table 11 shows that the social groups to which women belonged had a significant effect on their probabilities of receiving prenatal care: compared to Hindus (the control group), ST Christians, OBC Muslims, non-OBC Muslims were less likely to receive prenatal care by, respectively, 11.5, 8.8, and 4.3 points and non-ST Christians were more likely to receive prenatal care by 16.3 points. By contrast, after controlling for all the above factors, the effects of social group on the probability of receiving postnatal care were much more muted: the only significant social group effects were that, compared to Hindus, ST Christians were less likely (by 12.3 points), and non-ST Christians were more likely (by 17.3 points), to receive postnatal care.

5. Conclusions

This paper investigated whether there was a social gradient to health in India with respect to four health outcomes: the age at death; the self-assessed health status of elderly persons; the likelihood of elderly persons, who were in poor health, taking treatment for their ailments; and the likelihood of receiving prenatal and postnatal

care. The evidence suggested that living in a forward state (compared to living in a backward state) and belonging to a relatively affluent household significantly improved all four health outcomes. In addition, the age at death and the self-assessed health status of elderly persons was significantly affected by their household living conditions.

The level of education of persons exercised a significant influence on the likelihood of their receiving treatment or care. *Ceteris paribus*, the likelihood of elderly people, who were in poor health, taking treatment increased with their level of education; similarly, compared to poorly educated women, better educated women were more likely to receive prenatal and postnatal care.

However, even after controlling for these "group independent" factors, the social group to which people in India belonged had a significant effect on their health outcomes. Compared to (forward caste) Hindus, the average age at death in India – after imposing all the controls - was 4.9 years lower for *Adivasis*, 7.1 years lower for *Dalits*, and 6.1 years lower for Muslims. Similarly, compared to elderly Hindus, elderly Dalits, OBC Muslims, and non-OBC Muslims were – after imposing all the controls - *more* likely to be in poor health by, respectively, 2.6, 5.5, and 8.1 points. Again, compared to elderly Hindus in poor health, *Adivasis*, ST Christians, and *Dalits* were – after imposing all the controls - *less* likely to take treatment by, respectively, 10.6, 22.5, and 9.0 points and non-OBC Muslims and the non-Muslim OBCs were less likely to take treatment by, respectively, 7.7 and 5.7 points. Lastly, compared to Hindus, ST Christians, OBC Muslims, non-OBC Muslims were – after imposing all the controls - less likely to receive prenatal care by, respectively, 11.5, 8.8, and 4.3 points

There can be little doubt, therefore, that, on the basis of data from the M&HC sample, the sample analysed in this paper offered *prima facie* evidence of a social group bias to health outcomes in India. However, it is important to note that there are several deficiencies inherent in this study. First, there are important health-related attributes of individuals (smoking, diet, taking exercise, the nature of work) which are not - and, indeed, given the limitations of the data, cannot – be taken account of. All these factors are included in the package of factors termed "unobservable". If these unobservable factors were randomly distributed among the population this, in itself, would not pose a problem. However, there is evidence that there may be a group bias with respect to at least some of these factors. For example, if hard physical work is more inimical to health than more sedentary jobs, then of males aged 25-44 years, 42 percent of *Adivasi* and 47 percent of *Dalits*, compared to only 10 percent of Hindus, worked as casual labourers (Borooah *et. al*. 2007).

There is a natural distinction between inequality and inequity in the analysis of health outcomes. Inequality reflects the totality of differences between persons, regardless of the source of these differences and, in particular, regardless of whether or not these sources stem from actions within a person's control. Inequity reflects that part of inequality that is generated by factors outside a person's control. In a fundamental sense, therefore, while inequality may not be seen as "unfair", inequity is properly regarded as being unfair. The point about group membership is that while it may not be the primary factor behind health inequality, it is the main cause of health inequity. This paper's central message, conditional on the caveats noted earlier, is that being an *Adivasi*, *Dalit*, or Muslim in India seriously impaired, using the language of Sen (1992), the capabilities of persons to function in society. This is because, as this study has

shown, if you stand at the bottom of the social ladder in India, your risk of suffering premature death, poor health, and a lack of treatment and care is substantially higher than it is for your betters.

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Table 1
Deaths in India by Social Group

	NSS Persons by Social Group	NSS Persons by Social Group (%)	Deaths by Social Group (%) Total: 1,716	Mean Age of Death by Social Group	Median Age of Death by Social Group
Adivasi	**30,158**	**7.9**	**9.2**	**43.3**	**45**
Christian ST	**15,160**	**4.0**	**3.8**	**49.4**	**55**
Dalits	**64,942**	**16.9**	**17.6**	**41.6**	**45**
OBC (non-Muslim)	**125,508**	**32.8**	**33.4**	**48.4**	**55**
OBC (Muslim)	**18,591**	**4.9**	**4.8**	**43.4**	**51**
Hindu (FC)	**90,371**	**23.6**	**21.3**	**54.2**	**60**
Muslim (non-OBC)	**29,785**	**7.8**	**7.2**	**43.8**	**50**
Christian (non-ST)	**3,428**	**0.9**	**1.1**	**57.6**	**60**
Sikh	**3,268**	**0.9**	**1.2**	**57.5**	**65**
Other Religion	**2,077**	**0.5**	**0.5**	**64.6**	**70**
Total	**383,288**	**100**	**100**	**47.7**	**54**

Source: NSS 60th Round, Health File

Table 2
Medical Attention Received Before Death by Gender and Social Group

	Total Deaths	Medical Attention Received Before Death as % of Total Deaths	*Total Male Deaths*	Medical Attention Received Before Death as % of Total Male Deaths	*Total Female Deaths*	Medical Attention Received Before Death as % of Total Female Deaths
Adivasi	***157***	**59**	***85***	**52**	***72***	**67**
Christian ST	***64***	**53**	***28***	**57**	***36***	**50**
Dalits	***302***	**76**	***166***	**80**	***136***	**71**
OBC (non-Muslim)	***573***	**69**	***338***	**66**	***235***	**74**
OBC (Muslim)	***82***	**73**	***46***	**70**	***36***	**78**
Hindu (FC)	***366***	**71**	***215***	**72**	***151***	**70**
Muslim (non-OBC)	***123***	**74**	***73***	**70**	***50***	**80**
Christian (non-ST)	***18***	**67**	***13***	**62**	***5***	**80**
Sikh	***21***	**81**	***14***	**86**	***7***	**71**
Other Religion	***8***	**75**	***7***	**71**	***1***	**100**
Total	***1,714***	**70**	***985***	**69**	***729***	**71**

Source: NSS 60th Round, Health File

Table 3: Regression Estimates of the Age at Death Equation, by "Forward" and "Backward" States[+]

	All Deaths	Deaths in Forward States	Deaths in Backward States
Forward State	7.4***	-	-
	(4.80)		
Female	-1.2	-1.9	-0.5
	(0.83)	(0.94)	(0.25)
Labourer	-4.3**	-5.7**	-2.7
	(2.49)	(2.30)	(1.15)
Rural	4.9**	2.2	7.8***
	(2.51)	(0.83)	(2.63)
Structure	-2.9	-0.7	-3.7
	(1.43)	(0.19)	(1.50)
Latrine	1.5	2.5	0.5
	(0.71)	(0.94)	(0.14)
Drain	0.1	-3.2	4.2
	(0.06)	(1.10)	(1.25)
Water source	1.9	-2.5	6.2**
	(1.15)	(1.13)	(2.46)
Water treated	-2.2	-2.9	-2.3
	(1.01)	(1.06)	(0.65)
Water treatment	11.8***	10.9***	12.6***
	(4.25)	(3.12)	(2.79)
Cooking fuel	5.0**	4.6	6.2*
	(2.17)	(1.55)	(1.75)
Total monthly household expenditure	0.0004*	0.0004	0.0005
	(1.67)	(1.00)	(1.31)
Adivasis	-4.9*	-2.9	-6.7*
	(1.71)	(0.59)	(1.78)
Christian ST	-3.9	0.0	-6.5
	(0.94)	(.)	(1.39)
Dalits	-7.1***	-2.1	-11.5***
	(3.00)	(0.64)	(3.32)
OBC (non-muslim)	-2.5	-1.8	-3.0
	(1.29)	(0.69)	(1.04)
OBC (muslim)	-8.6**	-5.3	-11.9**
	(2.50)	(1.07)	(2.46)
Muslim (non-OBC)	-6.1**	-6.8*	-6.1
	(2.03)	(1.66)	(1.41)
Constant	43.7***	53.6***	41.3***
	(13.05)	(10.67)	(8.82)
Observations	1624	696	928
R-squared	0.08	0.06	0.07

Notes to Table 3

1. Absolute value of t statistics in parentheses.
2. * significant at 10%; ** significant at 5%; *** significant at 1%.
3. "Forward states": Andhra, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Delhi, Goa, Gujarat Haryana, Himachal, Karnataka, Kerala, Maharashtra, Punjab, Tamil Nadu, West Bengal. The remaining states and union territories were classified as "backward".
4. Structure=1 if housing type was *pucca*, or semi-*pucca*, or "serviceable" *kutcha* (i.e. good); 0 otherwise.
5. Latrine=1 if the latrines were flushing toilets or emptied into a sceptic tank; 0 otherwise.
6. Drain=1 if drains were underground or were covered *pucca*; 0, otherwise.
7. Water source=1 if if the source of drinking water was from a tap; 0 otherwise.
8. Water treated=1 if drinking water treated; 0 otherwise.
9. Water treated=1 if the nature of treatment was boiling, filtering, or ultra-violet/resin/reverse osmosis; 0 otherwise.
10. Cooking fuel=1 if the cooking fuel was gas, *gobar* gas, kerosene, or electricity; 0 otherwise.

Table 4: Own Perception of State of Health of Persons 60 years and above, by Social Group

	Excellent/ very good health	Good/Fair Health	Poor health	Total
Adivasis	**143**	**1,525**	**428**	**2,096**
	6.8	***72.8***	***20.4***	***100.00***
Christian ST	**76**	**534**	**115**	**725**
	10.5	***73.7***	***15.9***	***100.00***
Dalits	**220**	**3,440**	**1,423**	**5,083**
	4.3	***67.7***	***28.0***	***100.00***
OBC (non-muslim)	**529**	**7,848**	**2,746**	**11,123**
	4.8	***70.6***	***24.7***	***100.00***
OBC (muslim)	**73**	**819**	**409**	**1,301**
	5.6	***63.0***	***31.4***	***100.00***
Hindus FC	**629**	**6,867**	**2,179**	**9,675**
	6.5	***71.0***	***22.5***	***100.00***
Muslims (non-OBC)	**73**	**1,315**	**628**	**2,016**
	3.6	***65.2***	***31.2***	***100.00***
Christians (non-ST)	**29**	**328**	**143**	**500**
	5.8	***65.6***	***28.6***	***100.00***
Sikhs	**32**	**295**	**78**	**405**
	7.9	***72.8***	***19.3***	***100.00***
Other religions	**23**	**158**	**50**	**231**
	10.0	***68.4***	***21.6***	***100.00***
Total	**1,827**	**23,129**	**8,199**	**33,155**
	5.5	***69.8***	***24.7***	***100.00***

Table 5: Marginal Probabilities from the ordered logit model of own perception of state of health: persons 60 years and above

	Poor Health	Good/Fair Health	Excellent/Very Good Health
Forward State	-0.011**	0.008**	0.003**
	(2.33)	(2.32)	(2.33)
Age	0.052***	-0.039***	-0.013***
	(11.95)	(11.80)	(11.75)
Age squared	-0.0003***	0.0002***	0.0001***
	(8.95)	(8.88)	(8.88)
Female	0.043***	-0.032***	-0.011***
	(9.22)	(9.17)	(9.09)
Low education	-0.016***	0.012***	0.004***
	(2.82)	(2.86)	(2.71)
Medium education	-0.042***	0.030***	0.012***
	(5.76)	(6.11)	(4.98)
High education	-0.074***	0.048***	0.025***
	(8.24)	(10.06)	(6.00)
Rural	-0.009	0.007	0.002
	(1.44)	(1.46)	(1.46)
Structure	-0.032***	0.025***	0.007***
	(4.38)	(4.26)	(4.79)
Latrine	-0.010	0.008	0.003
	(1.59)	(1.59)	(1.57)
Drain	-0.002	0.001	0.0004
	(0.26)	(0.26)	(0.26)
Water source	-0.031***	0.023***	0.008***
	(6.20)	(6.22)	(6.06)
Water treated	-0.043***	0.032***	0.012***
	(5.88)	(6.81)	(6.12)
Water treatment	0.054***	-0.042***	-0.012***
	(5.88)	(5.67)	(6.65)
Cooking fuel	-0.034***	0.025***	0.009***
	(5.12)	(5.20)	(4.85)
Lowest quartile of monthly expenditure	0.044***	-0.034***	-0.010***
	(6.20)	(6.03)	(6.73)
Second quartile of monthly expenditure	0.037***	-0.029***	-0.008***
	(4.77)	(4.63)	(5.25)
Third quartile of monthly expenditure	0.022***	-0.017***	-0.005***
	(3.58)	(3.53)	(3.73)
Adivasis	-0.050***	0.035***	0.015***
	(5.81)	(6.41)	(4.74)
Christian ST	-0.083***	0.052***	0.031***
	(7.07)	(9.79)	(4.75)
Dalits	0.026**	-0.020***	-0.006***
	(3.37)	(3.30)	(3.60)
OBC (non-muslim)	0.001	-0.001	-0.0004
	(0.29)	(0.29)	(0.29)
OBC (muslim)	0.055***	-0.043***	-0.011***
	(4.19)	(4.01)	(5.29)
Muslim (non-OBC)	0.081***	-0.065***	-0.016***
	(7.23)	(6.84)	(9.16)
Christian (non-tribal)	0.035*	-0.027*	-0.008**
	(1.79)	(1.74)	(2.05)
Sikh	-0.026	0.018*	0.007
	(1.59)	(1.66)	(1.43)
Other religions	-0.021	0.015	0.006
	(0.82)	(0.85)	(0.75)
Observations	33130	33130	33130

See notes to Table 3
Low education: literate without schooling, below primary, primary.
Medium education: middle or secondary school.
High education: higher secondary or more.

Table 6: Ailments of persons 60 years and above who regarded their state of health as "poor", by social group

Soc Grp→ Ailm↓	Adv	ST, CH	Dalit	OBC non-Musl	OBC Muslim	Hindu FC	Musl non OBC	CH, non-ST	Sikh	Oth	TOT
GASTR	13	13	48	96	14	91	55	4	1	0	335
	5.04	16.25	5.13	5.43	4.70	5.77	12.39	3.45	1.85	0.00	6.02
CARD	23	3	85	223	49	298	71	38	10	7	807
	8.91	3.75	9.09	12.62	16.44	18.88	15.99	32.76	18.52	18.92	14.50
RESP	28	10	130	233	46	187	60	7	8	2	711
	10.85	12.50	13.90	13.19	15.44	11.85	13.51	6.03	14.81	5.41	12.77
JOINT	32	8	117	248	25	186	49	22	10	5	702
	12.40	10.00	12.51	14.04	8.39	11.79	11.04	18.97	18.52	13.51	12.61
KIDNY	5	0	20	30	3	44	6	2	3	1	114
	1.94	0.00	2.14	1.70	1.01	2.79	1.35	1.72	5.56	2.70	2.05
NEURO	10	2	43	71	16	86	23	3	1	2	257
	3.88	2.50	4.60	4.02	5.37	5.45	5.18	2.59	1.85	5.41	4.62
EYES	26	3	121	154	22	103	41	11	1	3	485
	10.08	3.75	12.94	8.72	7.38	6.53	9.23	9.48	1.85	8.11	8.71
DIABT	4	2	13	65	13	101	19	9	2	3	231
	1.55	2.50	1.39	3.68	4.36	6.40	4.28	7.76	3.70	8.11	4.15
FEVER	10	6	35	53	6	27	12	1	1	0	151
	3.88	7.50	3.74	3.00	2.01	1.71	2.70	0.86	1.85	0.00	2.71
DISAB	63	26	153	282	53	183	41	6	8	7	822
	24.42	32.50	16.36	15.96	17.79	11.60	9.23	5.17	14.81	18.92	14.77
ACC	4	0	18	40	7	46	5	0	2	0	122
	1.55	0.00	1.93	2.26	2.35	2.92	1.13	0.00	3.70	0.00	2.19
CANC	3	1	17	33	4	31	4	3	0	1	97
	1.16	1.25	1.82	1.87	1.34	1.96	0.90	2.59	0.00	2.70	1.74
OTHER	37	6	135	239	40	195	58	10	7	6	733
	14.34	7.50	14.44	13.53	13.42	12.36	13.06	8.62	12.96	16.22	13.17
TOT	258	80	935	1,767	298	1,578	444	116	54	37	5,567
	100	100	100	100	100	100	100	100	100	100	100

Definition of Ailments:

1. Gastro-intestinal problems (GASTR)
2. Cardiovascular disease (CARD)
3. Respiratory problems (RESP)
4. Disorders of the joints (JOINT)
5. Diseases of the kidney or urinary system (KIDNY)
6. Neurological disorders (NEURO)
7. Eye disorders (EYES)
8. Diabetes (DIABT)
9. Fever-related illness (FEVER)
10. Disabilities (DISAB)
11. Accidents/injuries/burns (ACC)
12. Cancer (CANC)
13. Other ailments (OTHER)

Source: NSS 60th Round, Health File

Table 7: Proportion of Persons 60 years, and who regarded their state of health as "poor", taking treatment for reported ailment, by social group

	Not taking treatment	Taking Treatment	Total
Adivasis	**98**	**157**	**255**
	38.43	***61.57***	***100.00***
Christian ST	**33**	**42**	**75**
	44.00	***56.00***	***100.00***
Dalits	**302**	**626**	**928**
	32.54	***67.46***	***100.00***
OBC (non-Muslim)	**470**	**1,273**	**1,743**
	26.97	***73.03***	***100.00***
OBC (Muslim)	**62**	**233**	**295**
	21.02	***78.98***	***100.00***
Hindus FC	**239**	**1,326**	**1,565**
	15.27	***84.73***	***100.00***
Muslims (non-OBC)	**118**	**319**	**437**
	27.00	***73.00***	***100.00***
Christians (non-ST)	**13**	**102**	**115**
	11.30	***88.70***	***100.00***
Sikhs	**10**	**44**	**54**
	18.52	***81.48***	***100.00***
Other religions	**4**	**32**	**36**
	11.11	***88.89***	***100.00***
Total	**1,349**	**4,154**	**5,503**
	24.51	**75.49**	**100.00**

Source: NSS 60th Round, Health File

Table 8: Marginal probabilities from the logit model of treatment received for ailments: persons, 60 years and above, who regarded their state of health as "poor"

	Marginal Probability of Receiving Treatment for Reported Ailment
Forward State	0.110***
	(9.28)
Female	0.013
	(1.01)
Low education	0.066***
	(4.67)
Medium education	0.108***
	(5.82)
High education	0.094***
	(3.11)
Living son(s)	0.083***
	(2.85)
Living daughter(s)	-0.21
	(0.98)
Rural	-0.016
	(1.22)
Economically independent	0.049***
	(3.23)
Economically partially dependent	0.035**
	(2.08)
Living alone	0.004
	(0.15)
Living with spouse	0.051***
	(3.93)
Confined to bed	0.055***
	(2.92)
Confined to home	-0.009
	(0.69)
Lowest quartile of monthly expenditure	-0.161***
	(7.84)
Second quartile of monthly expenditure	-0.115***
	(5.19)
Third quartile of monthly expenditure	-0.046***
	(2.64)
Adivasis	-0.106***
	(3.15)
Christian ST	-0.225***
	(3.59)
Dalits	-0.090***
	(4.20)
OBC (non-muslim)	-0.057***
	(3.34)
OBC (muslim)	-0.007
	(0.24)
Muslim (non-OBC)	-0.077**
	(2.82)
Christian (non-tribal)	0.017
	(0.34)
Sikh	-0.059
	(0.97)
Other religions	0.068
Pseudo-R-squared	0.0793
Observations	5484

Dependent variable = 1 if treatment received for reported ailment, =0, if not received
Absolute value of z values in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 9: The Predictive Performance of the Logit Model of the probability of taking treatment for ailment

	Taking treatment (M)	**Not taking treatment (~M)**	**Total**
Predicted as taking treatment (+)	**4027**	**1211**	**5238 P(M|+) = 76.9%**
Predicted as not taking treatment (-)	**115**	**131**	**246 P(~M|-)=53.3%**
Total	**4142 P(+|M) = 90.2%**	**1342 P(-|~M)=2.8%**	**5484 Correctly classified = 75.8%**

Persons, 60 years and above, who regarded their state of health as "poor"

Table 10
Proportion of ever married women who did not receive pre- and post-natal care

	Pre-Natal Care	Post-Natal Care
Adivasi	**30.5**	**43.7**
Christian ST	**37.9**	**44.1**
Dalits	**26.2**	**36.5**
OBC (non-Muslim)	**22.7**	**31.3**
OBC (Muslim)	**32.7**	**36.4**
Hindu (FC)	**14.7**	**26.7**
Muslim (non-OBC)	**26.1**	**34.5**
Christian (non-ST)	**1.5**	**10.4**
Sikh	**18.3**	**31.8**
Other Religion	**14.3**	**41.0**
Total	**23.5**	**33.2**

Source: NSS 60th Round, Health File

Table 11: Marginal probabilities from the logit model of pre- and pot-natal care

	Pre-natal care	Post-natal care
Forward State	0.153***	0.019
	(17.8)	(1.53)
Age	-0.002***	-0.001
	(3.56)	(0.59)
Low education	0.090***	0.040**
	(10.5)	(2.73)
Medium education	0.140***	0.110***
	(16.0)	(7.64)
High education	0.157***	0.140***
	(16.9)	(7.81)
Rural	-0.028**	-0.047***
	(2.85)	(3.55)
Labourer	-0.011	-0.020
	(0.64)	(0.85)
Lowest quartile of monthly expenditure	-0.033**	-0.010
	(2.33)	(0.52)
Second quartile of monthly expenditure	-0.045***	-0.013
	(3.33)	(0.73)
Third quartile of monthly expenditure	-0.020*	-0.017
	(1.81)	(1.14)
Adivasis	-0.025	-0.082***
	(1.38)	(3.14)
Christian ST	-0.115***	-0.123***
	(4.19)	(3.09)
Dalits	-0.019	-0.030
	(1.25)	(1.51)
OBC (non-muslim)	-0.003	0.004
	(0.21)	(0.25)
OBC (muslim)	-0.088***	-0.041
	(3.62)	(1.40)
Muslim (non-OBC)	-0.043**	-0.029
	(2.16)	(1.15)
Christian (non-tribal)	0.163***	0.173
	(4.46)	(2.78)
Sikh	-0.110*	0.005
	(1.86)	(0.09)
Other religions	0.039	-0.163*
	(0.67)	(1.96)
Pseudo-R-squared	0.113	0.028
Observations	9,696	6,874